Sub B1 end

an interference region at least partially comprising the second material, configured to selectively cause interference of wavefronts of the optical bias signal and the optical input signal entering the interference region,

wherein the optical output signal is representative of a Boolean logic output based on the at least one optical input signal and the optical output signal exits an interference region output.

Sub C2 Cntd A1

4. (Once Amended) The optical logic circuit of claim 1, wherein the interference region is configured to cause substantial cancellation of light exiting the interference region when light is provided to the interference region in the form of the optical input signal.

5. (Once Amended) The optical logic circuit of claim 1, wherein the interference region includes a first selective optical input receiving the optical input signal and a second selective optical input receiving a second optical input signal.

6. (Once Amended) The optical logic circuit of claim 5, wherein the interference region is configured to cause substantial cancellation of light exiting the interference region output when light is provided to the interference region through both the first selective optical input and the second selective optical input.

7. (Once Amended) The optical logic circuit of claim 1, wherein the Boolean logic output is a NOT (inverter) function.

8. (Once Amended) The optical logic circuit of claim 1, wherein the Boolean logic output is a NOT AND (NAND) function.

9. (Once Amended) The optical logic circuit of claim 1, having a multiplicity of optical pathways and interference regions configured to function as an optical processor.

10. (Once Amended) The optical logic circuit of claim 9, wherein the optical processor comprises NOT (inverter) gates and NOT AND (NAND) gates.

11. (Once Amended) An optical logic gate for an optical processor, comprising:

a substrate configured of a first material;

a patterned optical layer overlying the substrate at least partially configured of a second material, the patterned optical layer providing a plurality of optical conduits of the second material, at least two of the optical conduits configured to receive optical input signals, at least one of the optical conduits configured to provide optical output signals, and at least one of the at least two optical input signals being an optical bias input signal; and

an interference region coupled to at least two of the optical conduits configured to receive optical input signals and coupled to at least one of the optical conduits configured to provide optical output signals,

wherein the interference region is configured to provide a Boolean logic output signal based on the at least one optical input signal.

13. (Once Amended) The optical logic gate of claim 11, wherein the optical logic gate provides a Boolean NOT function as output.

14. (Once Amended) The optical logic gate of claim 11, further comprising:

at least three optical conduits configured to receive optical inputs.

15. (Once Amended) The optical logic gate of claim 14, wherein the optical logic gate provides a Boolean NOT function as output.

21. (Once Amended) The optical logic gate of claim 11, wherein the optical input signal is generated by a Laser diode.

22. (Once Amended) The optical logic gate of claim 11, wherein the optical input signal is generated by a semiconductor diode.

31. (Once Amended) A method of providing a Boolean logic optical output signal based on at least two optical input signals, comprising:

providing a first selective optical input signal to a first optical input;

providing a plurality of optical pathways formed of optical transmission material patterned on a substrate material;

providing a second selective optical input signal; and

providing at least a portion of the plurality of optical pathways to be configured to selectively cause interference between wavefronts of the first selective optical input signal and the second optical input signal; and

providing an optical output signal, the optical output signal based on the at least two input signals and representative of a Boolean logic function.

36. (Once Amended ) An optical logic circuit, comprising:

a substrate comprising a first material;

an optical layer overlaying the substrate at least partially comprising a second material, the optical layer being patterned to provide a plurality of optical pathways, at least two optical pathways configured to provide optical input signals, and at least one optical pathway configured to provide an optical output signal; and

an interference region configured to selectively cause interference of wavefronts of light from the optical input signals entering the interference region;

wherein the interference region is configured to provide a Boolean logic output signal based on the at least two optical input signals.

38. (Once Amended) The optical logic circuit of claim 36, wherein the interference region includes a first selective input, a bias input, and an interference region output, the bias input transmitting an optical bias signal.

39. (Once Amended) The optical logic circuit of claim 38, wherein the interference region is configured to cause substantial cancellation of light exiting the interference region output when a modulated light signal is provided to the interference region through the first selective input.

41. (Once Amended) The optical logic circuit of claim 40, wherein the interference region is configured to cause substantial cancellation of light exiting the interference region output when light is provided to the interference region through both the first selective input and the second selective input, and when no light is provided to both of the first and second selective inputs.

A5

42. (Once Amended) The optical logic circuit of claim 36, wherein the Boolean logic output is a NOT (inverter) function.

43. (Once Amended) The optical logic circuit of claim 36, wherein the Boolean logic output is a NOT AND (NAND) function.

44. (Once Amended) The optical logic circuit of claim 36, having a multiplicity of optical pathways and interference regions configured to function as an optical processor.

A6

46. (Once Amended) The optical logic circuit of claim 36, wherein the Boolean logic output is an XOR (exclusive OR) function.